(5) teeth, (6) illustrations (skull and teeth), and (7) key to the European forms. The synonymy is given only under the several subspecies, which are each diagnostically described, with measurements, a statement of its range, the sources and amount of material examined, and a list of the specimens contained in the British Museum. The descriptions of the subspecies occupy 14 pages, an average of a little more than a page to each, while the tables of cranial measurements fill four additional pages and include a total of 103 skulls, with 11 measurements of each skull.

(*b*) *Resources and Results.*—Although three of the here accepted subspecies of *Sciurus vulgaris* date from the eighteenth century, and two others from the early part of the nineteenth, none had become authoritatively recognized as tenable forms prior to 1896,[8] so that of the twelve forms now admitted six have been described and five others established since 1904. All but three of the 12 recognized forms are represented by fair series of specimens (5 to 174), the material examined aggregating 512 specimens. A list of the accepted forms, with their ranges and the number of specimens of each examined, here follows:

1. *Sciurus vulgaris vulgaris* Linné, 1758. Scandinavian Peninsula, except extreme north. Specimens examined, 53.
2. *Sciurus vulgaris varius* Gmelin, 1789. Extreme north of Scandinavian Peninsula, east into Russia. Spec. ex., 8.
3. *Sciurus vulgaris leucurous* Kerr, 1792. British Islands. Spec. ex., 174.
4. *Sciurus vulgaris russus* Miller, 1907. West-central Europe. Spec. ex., 26.
5. *Sciurus vulgaris fuscoater* Altum, 1876. East-central Europe. Spec. ex., 170.
6. *Sciurus vulgaris italicus* Bonaparte, 1838. Italy. Spec. ex., 38.
7. *Sciurus vulgaris lilæus* Miller, 1907. Greece. Spec. ex., 3.
8. *Sciurus vulgaris alpinus* Desmarest, 1822. Pyrenees. Spec. ex., 2.
9. *Sciurus vulgaris numantius* Miller, 1907. North-central Spain. Spec. ex., 22.
10. *Sciurus vulgaris infuscatus* Cabrera. Central Spain. Spec. ex., 5.
11. *Sciurus vulgaris segurœ* Miller, 1907. Southwest Spain. Spec. ex., 11. (Probably same as the next.)
12. *Sciurus vulgaris bœticus* Cabrera. Southern Spain. Spec. ex., 0.

[8] Nearly a dozen others of early date, proposed as "varieties," have never had currency, and are treated by Miller as untenable.

In general method and in details of treatment the "Catalogue" may well serve as a guide and an inspiration in similar undertakings. It furnishes for the first time a solid and orderly foundation for further systematic work on the mammal fauna of the area treated. Although the author's conclusions can not safely be challenged except on the basis of equal or better opportunities for investigation, doubtless some forms have been accepted that further study will show are not well founded, while others probably remain to be discovered. Finally, it is pleasant to contemplate the combination of circumstances that led to the preparation and publication of the work through a combination of the resources of two great national museums, and by an author so eminently fitted for the task.

J. A. Allen

Malaria, Cause and Control. By William B. Herms. New York, The Macmillan Company. 1913. Pp. xi + 163.

The purpose of this little work is to awaken the public interest in the control of malaria through the control of mosquitoes. Its appearance at this time is opportune, as, no doubt due to the example and influence of Celli in Italy, there has been a growing sentiment in many quarters in favor of the control of malaria by the extensive administration of quinine. Quinine control has not only proved impracticable under many circumstances, but under rigorous tests—particularly in the tropics—has even failed altogether. Professor Herms's book is based upon California experience and addresses itself directly to Californians; but in so far as similar conditions obtain elsewhere, it should have a much wider field of usefulness. The treatment is elementary throughout. A large part is devoted to the practical side of mosquito control.

The opening chapter, Economic Considerations, sets forth the direct and indirect losses occasioned by malaria and gives a concrete case to illustrate how serious these may be to a small community. It is shown that in a town of 4,000 inhabitants, in the northern Sacramento Valley, the expense and loss incurred during 1911, leaving out of consideration the resultant depreciation of real estate, amounted to about $75,000. In the itemized account it is shown that this community in combating malaria during 1911 spent $972.50 for quinine and $1,800 for patent medicines. The latter item is particularly striking when one considers that quinine is the only specific for malaria and that such medicines usually contain little or no quinine. They are therefore simply an additional drain upon the malarial victims. The author, basing upon experience elsewhere, states that effective mosquito-control work would cost this community about $2,000 a season and that the result would be the reduction of malaria by at least 50 per cent. the first year and 80 per cent. in the second year. The figures show strikingly how well mosquito-control work pays in a malarious region.

In the chapter, Malaria and its Transmission, the complex life history of the malarial parasites is explained in the simplest possible language, although not altogether satisfactorily. The author seems unaware that the pigment spots of the malarial parasites are the products of the ingested hæmoglobin. The following statement is surely an inversion of cause and effect, both the enlargement of the blood corpuscles and the anæmia being directly brought about by the parasites: "Enlarged parasitized corpuscles occur in this species [*Plasmodium præcox*], but merely as a coincident, since enlarged corpuscles commonly occur in anæmia, and these may be entered by the sporozoits" (p. 21). On page 28 the question is again brought up, and favored, whether there are reservoir hosts other than man for the asexual phases of the parasites. This needlessly obscures the subject, as there is a wealth of evidence to controvert such a belief and it is dismissed by all careful students.

The two chapters Mosquitoes in General and Anopheline or Malaria Mosquitoes show a fragmentary knowledge which the author might easily have remedied by a little careful reading in the works cited in his brief bibliography. On page 31 the statement is made that "the Culicidæ are distinguished from all other Nematoceran Diptera by the presence of scales on the wings and body." Such scales, however, occur in the Psychodidæ and in certain Tipulidæ and Chironomidæ. On page 33 the Culicidæ are said to divide into two subfamilies, the Anophelinæ with the palpi long in both sexes, and the Culicinæ with the palpi long in the male and short in the female. Aside from the fact that the relative length of the palpi is now discarded as a primary character by most students, there exist a considerable number of species with the palpi short in both sexes (Ædinæ of the older authors) and still others which must be looked upon as intermediate. The statement that "the males of all species of mosquitoes, as far as known, are provided with plumose antennæ" is far from correct. The statement (p. 42) that in all "culicine" (as against "anopheline") mosquitoes "except *Stegomyia calopus* the eggs are placed on end, forming a boat-shaped pack or raft," shows that the author is unaware of the considerable progress made within the last ten years in the knowledge of mosquito biology. The statement, too, that single mosquitoes may lay 750 eggs is contrary to the experience of many reliable observers. On the other hand, it is gratifying to find the author contending against the common idea that mosquitoes fly considerable distances. He rightly states that as a rule mosquitoes do not fly far and that the salt-marsh species are an exception in this respect. The chapters which follow deal with mosquito control. The importance of locating actual breeding-places is emphasized. The value of different control measures is discussed, the permanent abolition of breeding-places being held out as the ideal. An insight is given into practical work by a brief account of the local campaigns with which the author has been connected. The book should be useful in

convincing the uninformed that malaria-control through the control of mosquitoes is not only possible, but that it pays. While the inaccuracies do not materially detract from the practical value of the book, it is to be hoped that in the interest of truth they will be corrected in a future edition.

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SPECIAL ARTICLES

THE ORIENTAL CYCADS IN THE FIELD

Cycads in the field, cycads in the botanical garden and cycads in the greenhouse, are so different that descriptions based upon plants growing in the garden should be checked by observations in the field, and accounts based upon greenhouse material must be viewed with great suspicion.

In the field, *Cycas circinalis* is said to produce a crown of leaves every year, and under ordinary greenhouse conditions, new crowns are usually produced every year; but where the heat is extreme and the rainfall excessive, two crowns each year may be produced for many years in succession. *Dioon* at Kew surpasses anything I have ever seen at Chavarrillo, but if the Kew specimens should be exposed to the blazing sun of the Mexican tropics, their magnificent crowns would probably wither in a few days. In cycad seedlings at the University of Chicago, scale leaves, which in the field would never have been anything but scale leaves, quite regularly develop into foliage leaves. The cycads, like roses, pinks and chrysanthemums, may appear to better advantage on account of greenhouse conditions, but for phylogenetic studies, their value is doubtful.

During the past year it was my privilege to study in the field the five oriental genera of cycads. Two of these genera are found only in South Africa, two only in Australia, and the remaining genus, *Cycas,* extends from Japan to Australia and Madagascar. Thus all the oriental cycads, except *Cycas,* are confined to the southern hemisphere; while all the western cycads, except *Zamia,* are confined to the northern. No genus is common to the east and the west.

The three genera found in Australia are *Cycas, Bowenia* and *Macrozamia.* All three are abundant in Queensland, the northeast part of Australia, and *Cycas* and *Bowenia* may be confined to this region; *Macrozamia* extends into New South Wales and is represented by at least one species on the western coast.

Cycas, in Australia, is represented by five species, only one of which, *Cycas media,* was studied in the field. The other three were seen in gardens. *Cycas media* was studied at Rockhampton, on the Tropic of Capricorn, and at Freshwater, in the Cairns district, about 700 miles farther north.

Eichler's account, in Engler and Prantl's "Die Natürlichen Pflanzenfamilien," gives *Cycas media* a height of 20 meters, making it the tallest of the cycads. This is undoubtedly a mistake. Dr. F. M. Bailey, in his "Flora of Queensland," states that the species reaches a height of 8 to 10 feet (2.4 to 3.05 meters) and sometimes twice that height. Mr. Simmons, director of the Botanical Garden at Rockhampton, and Mr. Anderson, director of the Botanical Garden at Townsville, assured me that the plant seldom exceeds 3 meters in height and that specimens 6 meters in height were extremely rare. Mr. Sydney Snell, who for many years has lived and hunted in the Berserker Ranges near Rockhampton, showed me the tallest specimen he had seen, and it measured about 6 meters. I received similar reports all the way from the southern to the northern limit of the species. At Freshwater, in the Cairns district, I found one plant which was 7.01 meters in height. The mistake in Eichler's account probably arose in mistaking feet for meters.

A section of the trunk shows the polyxylic condition, but a specimen 2 meters high shows only two or three zones of wood, while a specimen of *Cycas revoluta* half a meter in height might show as many as three or four.

The trunk is ribbed, like that of *Dioon spinulosum,* and the ribs are due to the alternation of foliage leaves and scale leaves or